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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/955,288

09/19/2001

Joo-Hyong Lee

LGS/S-0030A

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7590

10/24/2003

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EXAMINER

DIAZ, JOSE R

ART UNIT

PAPER NUMBER

2815

DATE MAILED: 10/24/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/955,288

Applicant(s)

LEE, JOO-HYONG

Examiner

José R Díaz

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 August 2003.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4, 11-27 and 29-38 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 35-38 is/are allowed.
- 6) ☒ Claim(s) 1-4, 11, 13, 15, 16, 18, 20-22, 24, 27 and 29-34 is/are rejected.
- 7) ☒ Claim(s) 12, 14, 17, 19, 23, 25 and 26 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☒ Certified copies of the priority documents have been received in Application No. 09/290,891.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Claim Objections

1. Claims 11-12, 20 and 23 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 11 recites a limitation which is now incorporated in claim 1. For example, both claims 1 and 11 require that the heavily doped region be separated or formed at a distance away from the first contact region. Furthermore, claims 20 recites a limitation which is now incorporated in claim 15.

2. Claims 12 and 23 are objected due to their dependency on claims 11 and 20, respectively.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 24, 27 and 30-34 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Regarding claim 24, the term "and/or" renders the claim indefinite because it is not clear what is the invention that applicant intends to claim. Regarding claim 27, it is not clear how the field oxide layer separates the first well and the second well.

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5. Claims 30-34 are objected due to its dependency on claim 24.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 1-4, 11, 13, 18, 21, and 22 are rejected under 35 U.S.C. 102(e) as being anticipated by Farrenkopf et al. (US Patent No. 5,899,714).

Regarding claims 1, 11 and 21, Farrenkopf et al. teach a semiconductor device comprising: a semiconductor substrate (20) having a first conductivity type (P-) (see Figs. 2.1 and 2.3); a first well (38D) having a second conductivity type (N-) formed in a first region in a major surface of the semiconductor substrate (see Fig. 2.3); a first MOS transistor (ISO. P-CHAN.) having the first conductivity type (P) and a first contact region (62B) having the second conductivity type (N+) formed in the first well (see Fig. 2.3); field oxide regions (44) formed on a surface of the first well (see Fig. 2.3); and a heavily doped region of buried layer (34D) having the second conductivity type (N+) formed in the first well (38D) at a distance away from the first contact region (62B) and the field oxide regions (44), wherein the distance is greater than 0 (see Fig. 2.3).

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Regarding claims 2 and 22, Farrenkopf et al. teach a second well (40C) having a second conductivity type (P-) formed in a second region in a major surface of the semiconductor substrate (see Fig. 2.3); a second MOS transistor (ISO. N-CHAN.) having the second conductivity type (N) and a second contact region (60B) having the second conductivity type (P+) formed in the second well (see Fig. 2.3); and a heavily doped region of buried layer (36C) having the first conductivity type (P) formed between the second contact region (60B) in the second well (40C) and a surface (see interface between P-well 40C and N- layer 22) of the second well on an opposite portion of the second well from the second contact region (60B) within the semiconductor substrate (20) (see Fig. 2.3).

Regarding claim 3, Farrenkopf et al. teach that the junction depth of the first and second wells is, for example, in the range of 1.5 to 2.0 μm (see col. 9, lines 13-14 and Fig. 1.1).

Regarding claims 4 and 18, Farrenkopf et al. teach that the concentration of the heavily doped region of buried layer (36C) having the first conductivity type (P) is higher than that of the second well (P-) and lower than that of the second contact region (P+) (see Fig. 2.3).

Regarding claim 13, Farrenkopf et al. further teach a second well (40C) having a first conductivity type (P-) formed in a second region of the semiconductor substrate (20), wherein the heavily doped region of buried layer (36C) having the first conductivity type (P) formed in the second well (40C) at a distance away from the second contact

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region (60B) and the field oxide regions (44), wherein the distance is greater than 0 (see Fig. 2.3).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 1, 11, 15-16, 20-21 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's admitted prior art in view of Bulucea et al. (US Pat. No. 5,441,900).

Regarding claims 1, 11, 15-16, 20 and 29, Applicant acknowledges a well known semiconductor device comprising: a semiconductor substrate (11) having a first conductivity type (see Fig. 1); a first well (21) having a second conductivity type (N-well) formed in a first region in a major surface of the semiconductor substrate (see Fig. 1); a first MOS transistor (37) having the first conductivity type (P) and a first contact region (30) having the second conductivity type (N) formed in the first well (21) (see Fig. 1); and field oxide regions (13) formed on a surface of the first well (21) (see Fig. 1). Furthermore, Applicant acknowledges the formation of a second well (22) having a first conductivity type (P) formed in a second region of the semiconductor substrate (11) (see Fig. 1)

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However, Applicant teaches that the prior art fails to teach a heavily doped region of buried layer having the second conductivity type formed in the first well at a distance away from the first contact region and the field oxide regions, wherein the distance is greater than 0. Bulucea et al. teaches a heavily doped region of buried layer (29, 30) having the second conductivity type (please note that Ca is a n-type dopant, col. 5, lines 23-25) formed in the first well (8) at a distance away from the first contact region (25) and the field oxide regions (not shown) (see fig. 2).

Applicant's admitted prior art and Bulucea et al. are analogous art because they are from the same field of endeavor as applicant's invention. At the time of the invention it would have been obvious to a person of ordinary skill in the art to include a heavily doped region of buried layer having the second conductivity type formed in the first well at a distance away from the first contact region and the field oxide regions. The motivation for doing so, as is taught by Bulucea et al., is to suppress latch-up in CMOS structure (abstract). Therefore, it would have been obvious to combine Bulucea et al. with applicant's admitted prior art to obtain the invention of claims 1, 11, 15-16, 20 and 21.

Regarding claim 21, Bulucea et al. teaches that the heavily doped region (30) of buried layer having a second conductivity type is formed not below a field oxide layer separating the first and second wells (consider the pn junction between the regions 28 and 29, which is analogous to the pn junction shown below the fox region 13 in figure 1 of applicant's admitted prior art).

Allowable Subject Matter

10. Claims 35-38 are allowed.

11. Claim 24 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action.

12. Claim 27 and 30-34 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

13. Claims 12, 14, 17, 19, 23, and 25-26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

14. The following is a statement of reasons for the indication of allowable subject matter: the prior art fails to teach, disclose, or suggest, either alone or in combination, a semiconductor device comprising a heavily doped region of buried layer formed in a well and not below the field oxide layer positioned above the portion of the substrate where the first well and the second well contact one another, separated from the contact region, and not extending under the MOS transistor.

Response to Arguments

15. Applicant's arguments with respect to claims 1-4, 11, 13, 15-16, 18, 20-22, 24, 27 and 29-34 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

16. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Correspondence


17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to José R Díaz whose telephone number is (703) 308-6078. The examiner can normally be reached on 9:00-5:00 Monday, Tuesday, Thursday and Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (703) 308-2772. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

JRD


GEORGE ECKERT
PRIMARY EXAMINER